

FORM PTO-1390 (REV 11-98)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER	
<b>TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371</b>				ICC-192/PCT/US	
				U.S. APPLICATION NO. (If known, see 37 CFR 1.5.) <b>10/069879</b>	
INTERNATIONAL APPLICATION NO. <b>PCT/EP00/00536</b>		INTERNATIONAL FILING DATE <b>25 JANUARY 2000 (25.01.00)</b>		PRIORITY DATE CLAIMED <b>25 JANUARY 1999 (25.01.99)</b>	
TITLE OF INVENTION <b>PROCESS FOR ATTACHING THE OIL SUMP TO AN ENGINE BLOCK OF AN INTERNAL COMBUSTION VEHICLE</b>					
APPLICANT(S) FOR DO/EO/US <b>RITTER, KARL-HEINZ and SCHMATZ, THOMAS M.</b>					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(I).</li> <li>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19<sup>th</sup> month from the earliest claimed priority date.</li> <li>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> <li>a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</li> </ol> </li> <li>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</li> <li>7. <input checked="" type="checkbox"/> A copy of the International Search Report (PCT/ISA/210).</li> <li>8. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input type="checkbox"/> have been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li> <li>d. <input type="checkbox"/> have not been made and will not be made.</li> </ol> </li> <li>9. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</li> <li>10. <input checked="" type="checkbox"/> An executed oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</li> <li>11. <input checked="" type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409).</li> <li>12. <input checked="" type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</li> </ol>					
Items 13. to 19. below concern document(s) or information included:					
<ol style="list-style-type: none"> <li>13. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98, listing the documents cited in the International Search Report and enclosed copies thereof.</li> <li>14. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</li> <li>15. <input checked="" type="checkbox"/> A <b>FIRST</b> preliminary amendment <input type="checkbox"/> A <b>SECOND</b> or <b>SUBSEQUENT</b> preliminary amendment.</li> <li>16. <input type="checkbox"/> A substitute specification.</li> <li>17. <input type="checkbox"/> A change of power of attorney and/or address letter.</li> <li>18. <input type="checkbox"/> Certificate of Mailing by Express Mail.</li> <li>19. <input checked="" type="checkbox"/> Other items or information: Copies of Request, Demand, Written Opinion, and Reply to written opinion; and Return Receipt Postcard</li> </ol>					

JC13 Rec'd PCT/PTO 01 MAR 2002

U.S. APPLICATION NO. (If known, see 37 CFR 1.5.) <b>10/069879</b>		INTERNATIONAL APPLICATION NO. <b>PCT/IE900/00100</b>		ATTORNEY'S DOCKET NUMBER <b>ICC-192/PCT/US</b>	
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20. <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... <b>\$1,000.00</b> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$860.00</b> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <b>\$710.00</b> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$690.00</b> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$100.00</b>  <div style="text-align: right;"><b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b></div>				<b>CALCULATIONS      PTO USE ONLY</b>  <div style="border: 1px solid black; height: 100px; width: 100%;"></div>	
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)). <span style="float: right;">+      \$</span>					
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	19 - 20 =		X \$ 18.00	\$	
Independent claims	3 - 3 =		X \$ 80.00	\$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable) <span style="float: right;">+      \$</span>					
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$?	
Reduction of ½ for filing by small entity, if applicable. A Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28). <span style="float: right;">\$ ---</span>					
<b>SUBTOTAL =</b>				\$860.00	
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)). <span style="float: right;">+      \$</span>					
<b>TOTAL NATIONAL FEE =</b>				\$860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property <span style="float: right;">+      \$</span>				0.00	
<b>TOTAL FEES ENCLOSED =</b>				\$860.00	
				Amount to be:	
				Refunded      \$	
				Charged      \$	

a. ☐ A check in the amount of \$\_\_\_\_\_ to cover the above fees is enclosed.

b. ☒ Please charge my Deposit Account No. 12-2135 in the amount of **\$860.00** to cover the above fees. A duplicate copy of this sheet is enclosed.

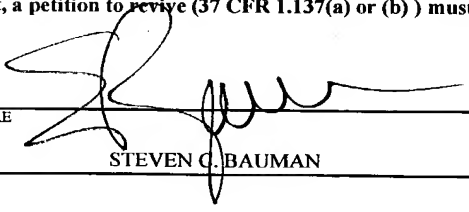
c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to my Deposit Account No. 12-2135. A duplicate copy of this sheet is enclosed.

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

STEVEN C. BAUMAN  
LOCTITE CORPORATION  
1001 TROUT BROOK CROSSING  
ROCKY HILL, CT 06067 USA

SIGNATURE \_\_\_\_\_



NAME **STEVEN C. BAUMAN**

REGISTRATION NUMBER **33,832**

ICC-192/PCT/US  
PATENT APPLICATION

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

U.S. National Phase Entry of:

In re Application of: )  
: Examiner: NYA  
Karl-Heinz Ritter and )  
Thomas M. Schmatz : Group Art Unit: NYA  
: )  
Int'l Appln No.: :  
PCT/EP00/00536 )  
: )  
Int'l Filing Date: )  
25 January 2000 :  
: )  
: )  
For: PROCESS FOR ATTACHING )  
THE OIL SUMP TO AN ENGINE: )  
BLOCK OF INTERNAL )  
COMBUSTION VEHICLE : March 1, 2002

Commissioner for Patents  
Washington, D.C. 20231

**PRELIMINARY AMENDMENT**

Sir:

Preliminary to examination on the merits, kindly amend  
the application as follows:

IN THE CLAIMS:

Kindly amend Claims 1-19 to read as follows:

1. (Amended) A process for attaching an oil sump to  
an engine block of a combustion engine, a seal being made by a  
curable composition between a first sealing surface on the oil  
sump and a second sealing surface on the engine block, to which

the curable composition is applied to one or both sealing surfaces, wherein when cured the curable composition demonstrates adhesion sufficient to secure the oil sump to the engine block, threaded bolts are not used as fastening elements and the oil sump is fixed to the engine block at least during the curing of the curable composition.

2. (Amended) The process according to claim 1, wherein the curable composition demonstrates adhesion of at least 0.5 N/mm<sup>2</sup>.

3. (Amended) The process according to claim 1, wherein the curable composition is a silicone composition.

4. (Amended) The process according to claim 1, wherein the oil sump is stamped from steel sheet or plastics material and a cast aluminum or grey cast iron engine block.

5. (Amended) The process according to claim 1, wherein the edge of the oil sump is designed such that self-fixing takes place when the oil sump is joined to the engine block.

6. (Amended) The process according to claim 5, wherein the oil sump has a fixing edge and the engine block has a flange such that the fixing of the oil sump takes place by the snapping of the fixing edge onto the flange.

7. (Amended) The process according to claim 1, wherein barb-like tongues which rest against a flange on the engine block are formed at the edge of the oil sump.

8. (Amended) The process according to claim 1, wherein the edge of the oil sump is designed such that the oil sump is fixable to the engine block by a reshaping process taking place after joining.

9. (Amended) The process according to claim 1, wherein after the oil sump has been joined to the engine block, holding clamps are attached in order to fix the oil sump to the engine block.

10. (Amended) The process according to claim 1, wherein seating surfaces are formed on the oil sump and the engine block such that the sealing gap formed therebetween increases in size inwards.

11. (Amended) A combustion engine comprising an engine block and an oil sump attached thereto, wherein the oil sump is attached to the engine block with a curable composition whose adhesion when cured is sufficient to secure the oil sump to the engine block.

12. (Amended) The combustion engine according to claim 11, wherein the composition when cured demonstrates an adhesion of at least 0.5 N/mm<sup>2</sup>.

13. (Amended) The combustion engine according to claim 11, wherein the curable composition is a silicone composition.

14. (Amended) The combustion engine according to claim 11, wherein the oil sump is stamped from sheet steel or

plastics material and the engine block is constructed from cast aluminum or grey cast iron.

15. (Amended) The combustion engine according to claim 11, wherein a self-fixing takes place when the oil sump is joined to the engine block.

16. (Amended) The combustion engine according to claim 16, wherein the oil sump has a fixing edge and the engine block has a flange such that the fixing of the oil sump takes place by the snapping of the fixing edge onto the flange.

17. (Amended) The combustion engine according to claim 15, wherein barb-like tongues which rest against a flange on the engine block are formed at the edge of the oil sump.

18. (Amended) The combustion engine according to claim 15, wherein the oil sump and the engine block having sealing surfaces which are shaped such that the sealing gap formed between them increases in size inwards.

19. (Amended) A flange connection with two flange elements between which a seal is made with a curable composition, wherein threaded bolts are not used as connecting elements.

#### REMARKS

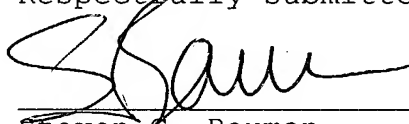
Applicants have amended all of the claims to remove reference numerals and/or multiple dependencies, thereby placing the claims in better conformance with U.S. practice. Claims 1-

19 are thus presented for examination, with Claims 1, 11 and 19 being independent.

Consistent with the recent changes to the federal regulations regarding the way in which amendments are to be introduced to a pending application, Applicants have presented replacement pages for the specification and replacement claim pages which reflect these amendments.

Applicants' undersigned attorney may be reached by telephone at (860) 571-5001, by facsimile at (860) 571-5028 or by e-mail at [steve.bauman@loctite.com](mailto:steve.bauman@loctite.com). All correspondence should be directed to the address given below.

Respectfully submitted,



Steven C. Bauman  
Attorney for Applicants  
Registration No. 33,832

LOCTITE CORPORATION  
Legal Department  
1001 Trout Brook Crossing  
Rocky Hill, Connecticut 06067

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VERSION OF CLAIMS WITH MARKINGS TO SHOW CHANGES MADE

1. (Amended) A [P]rocess for attaching [the] an oil sump [(10)] to an engine block [(30)] of a combustion engine, a seal being made by [means of] a curable composition [(20)] between a first sealing surface [(14)] on the oil sump [(10)] and a second sealing surface [(36)] on the engine block [(30)], [for] to which the curable composition is applied to one or [to] both sealing surfaces [characterized in that], wherein when cured the [a] curable composition [(20) is used whose] demonstrates adhesion [when cured is] sufficient to secure the oil sump [(10)] to the engine block [(30)], [in that] threaded bolts are not used as fastening elements and [in that] the oil sump [(10)] is fixed to the engine block [(30)] at least during the curing of the curable composition [(20)].

2. (Amended) The [P]rocess according to claim 1, [characterized in that a] wherein the curable composition [(20) with an] demonstrates adhesion of at least 0.5 N/mm<sup>2</sup>[, especially of more than 0.8 N/mm<sup>2</sup>, is used].

3. (Amended) The [P]rocess according to claim[s] 1 [or 2], [characterized in that] wherein the curable composition [(20)] is a silicone composition.

4. (Amended) The [P]rocess according to [one of] claim[s] 1 [to 3], [characterized in that an] wherein the oil sump [(10)] is stamped from steel sheet or [made from] plastics material and a cast aluminum or grey cast iron engine block [(30) are used].



5. (Amended) The [P]rocess according to [one of] claim[s] 1 [to 4], [characterized in that] wherein the edge of the oil sump is designed such that [a] self-fixing takes place when the oil sump [(10)] is joined to the engine block [(30)].

6. (Amended) The [P]rocess according to claim 5, [characterized in that] wherein the oil sump [(10)] has a fixing edge [(16)] and the engine block [(30)] has a flange [(34) and in] such that the fixing of the oil sump [(10)] takes place by the snapping of the fixing edge [(16)] onto the flange [(34)].

7. (Amended) The [P]rocess according to claim 1, [characterized in that] wherein barb-like tongues [(18)] which rest against a flange [(34)] on the engine block [(30)] are formed at the edge [(12)] of the oil sump [(10)].

8. (Amended) The [P]rocess according to claim 1, [characterized in that] wherein the edge of the oil sump is designed such that the oil sump [(10)] is fixable to the engine block [(30)] by a reshaping process taking place after joining.

9. (Amended) The [P]rocess according to claim 1, [characterized in that] wherein after the oil sump [(10)] has been joined to the engine block [(30)], holding clamps [(40)] are attached in order to fix the oil sump [(10)] to the engine block [(30)].

10. (Amended) The [P]rocess according to [one of the] claim[s] 1 [to 10], [characterized in that there] wherein seating surfaces are formed on the oil sump [(10)] and the engine block [(30) sealing surfaces (14, 36) which are shaped]

such that the sealing gap formed [between them] therebetween increases in size inwards.

11. (Amended) A [C]combustion engine [having] comprising an engine block [(30)] and an oil sump [(10)] attached thereto, [characterized in that] wherein the oil sump [(10)] is attached to the engine block [(30)] with a curable composition [(20)] whose adhesion when cured is sufficient to secure the oil sump [(10)] to the engine block [(30)].

12. (Amended) The [C]combustion engine according to claim 11, [characterized in that] wherein the composition [(20)] when cured [has] demonstrates an adhesion of at least  $0.5 \text{ N/mm}^2$ [, especially of more than  $0.8 \text{ N/mm}^2$ ].

13. (Amended) The [C]combustion engine according to claim[s] 11 [or 12], [characterized in that] wherein the curable composition [(20)] is a silicone composition.

14. (Amended) The [C]combustion engine according to [one of] claim[s] 11 [to 13], [characterized in that] wherein the oil sump [(10)] is stamped from sheet steel or [made from] plastics material and the engine block [(30)] consists of] is constructed from cast aluminum or grey cast iron.

15. (Amended) The [C]combustion engine according to [one of] claim[s] 11 [to 14], [characterized in that threaded bolts are not used as fastening elements and in that the edge of the oil sump is designed such that] wherein a self-fixing takes place when the oil sump [(10)] is joined to the engine block [(30)].

16. (Amended) The [C]combustion engine according to claim 16, [characterized in that] wherein the oil sump [(10)] has a fixing edge [(16)] and the engine block [(30)] has a flange [(34) and in] such that the fixing of the oil sump [(10)] takes place by the snapping of the fixing edge [(16)] onto the flange [(34)].

17. (Amended) The [C]combustion engine according to claim 15, [characterized in that] wherein barb-like tongues [(18)] which rest against a flange [(34)] on the engine block [(30)] are formed at the edge [(12)] of the oil sump [(10)].

18. (Amended) The [C]combustion engine according to claim 15, [characterized in that there are formed on] wherein the oil sump [(10)] and [on] the engine block [(30)] having sealing surfaces [(14, 36)] which are shaped such that the sealing gap formed between them increases in size inwards.

19. (Amended) A [F]flange connection with two flange elements between which a seal is made with a curable composition, [characterized in that] wherein threaded bolts are not used as connecting elements.

ICC-192/PCT/US  
PATENT APPLICATION

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

U.S. National Phase Entry of:

In re Application of: )  
: Examiner: NYA  
Karl-Heinz Ritter and )  
Thomas M. Schmatz : Group Art Unit: NYA  
: )  
Int'l Appln No.: :  
PCT/EP00/00536 )  
: )  
Int'l Filing Date: )  
25 January 2000 :  
: )  
For: PROCESS FOR ATTACHING )  
THE OIL SUMP TO AN ENGINE: )  
BLOCK OF INTERNAL )  
COMBUSTION VEHICLE : March 1, 2002

Commissioner for Patents  
Washington, D.C. 20231

**PRELIMINARY AMENDMENT**

Sir:

Preliminary to examination on the merits, kindly amend  
the application as follows:

IN THE CLAIMS:

Kindly amend Claims 1-19 to read as follows:

1. (Amended) A process for attaching an oil sump to  
an engine block of a combustion engine, a seal being made by a  
curable composition between a first sealing surface on the oil  
sump and a second sealing surface on the engine block, to which

2/pnts

-----  
Process for attaching the oil sump to an engine block of a combustion engine, combustion engine with which the oil sump is attached to the engine block in accordance with that process, and flange connections which are made in accordance with that process  
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Description

The invention relates to a process for attaching the oil sump to an engine block of a combustion engine, a seal being made between engine block and oil sump by means of a curable composition, as well as a combustion engine with which the oil sump is attached to the engine block in accordance with that process, and in general flange connections which are made in accordance with that process.

There is known from EP-A-0 284 027 an anaerobically vulcanized sealing composition, as well as its use on parts of hydraulically controlled mechanisms and combustion engines, such as the connection between a flange part to an oil sump and an engine block, a connection between cylinder head and cylinder head cover and a connection at the gear box. As in particular the mention as seal of the connection between cylinder head and cylinder head cover shows, screws are here additionally used as fastening elements.

A method of making polysiloxane sealings is known from EP-A-0 409 079, making a seal to the flange of a motor vehicle oil sump being quoted as an application example. Openings for the fastening bolts are provided for in the flange of the oil sump in the respective drawing so that the fastening bolts are here, too, apparently used as connecting elements.

25 In a process known from DE-U-298 12 978, the oil sump is also secured to the engine block in the conventional manner by

screws. To this end, the engine block must be provided with a number of threaded holes and a corresponding number of screws must then be screwed in.

5

The object of the invention is to save on these processes and components.

This object is achieved in accordance with the invention by a curable composition being used whose adhesion when cured is sufficient to secure the oil sump to the engine block.

It has shown that the adhesion of curable compositions or adhesives is sufficient to secure an oil sump permanently and securely to an engine block. Preferably an adhesive with an adhesion of at least  $0.5 \text{ N/mm}^2$ , especially of more than  $0.8 \text{ N/mm}^2$ , is used.

With the securing of the oil sump to the engine block in accordance with the invention, the threaded holes in the engine block are unnecessary and there is no screwing-in of the securing screws. The oil sump can easily be stamped from steel sheet. A machining, e.g. a surface grinding or milling, of the sealing surfaces at the engine block and at the oil sump is not necessary as the curable composition can equalize unevennesses up to  $0.5 \text{ mm}$  or even  $1 \text{ mm}$ . The maximum allowable unevenness is limited by the fact that, with larger gaps between the engine block and the oil sump, there is the danger that the curable composition will be blown out in the generally customary leak test by displacement with air (blow-out test) on the finally assembled engine. Some 30 minutes are needed to assemble the engine, and the composition cannot cure sufficiently within this time span to resist the overpressure of about  $0.5 \text{ bar}$  applied in the leak test with thicker layer thicknesses especially if the curing time depends on the thickness of the layer as in the case of silicone adhesives which cure by humidity.

As there are no securing screws for the oil sump, there is a reduction in costs as a result of a decrease in the number of components, a reduction in the assembly time and a simplification of the manufacture of the engine block due to the absence of the threaded holes. Further, cost advantages result from the fact that the oil sump can be a stamped part.

The curable composition can be any adhesive which is suitable for the materials and which possesses a sufficient adhesion for the materials from which the engine block and the oil sump are made, that is metal, especially grey cast iron, aluminum-magnesium alloys and - for the oil sump - plastic. Obviously, the composition must be sufficiently resistant to the media used (oil, water/glycol, antifreeze). FIP (formed in place) products are particularly suited. A suitable curable composition is especially LOCTITE® RTV Silikon 5900 (RTV = room temperature vulcanization).

As such compositions have curing times of up to some days, it is generally necessary to attach the oil sump to the engine block during this time by a self-fixing connection. Clamps and snap connections are suitable for this. The edge of the oil sump can, for example, snap onto a flange of the engine block, or individual holding grips which are bent round the flange of the engine block can be provided at that edge. The edge of the oil sump can also be crimped or curled round the flange on the engine block. As these fixing means are only necessary until the curable composition has cured, they can be removed afterwards if need be and used again.

The sealing surfaces on the engine block and on the oil sump are preferably formed such that there is an uneven layer thickness over the width of the sealing surfaces. To this end, the edge of one or both of the sealing surfaces can have a chamfer with a angle of, e.g., 30° and a width of about 2 mm or be rounded off with a radius of about 4.5 mm, the gap formed being partially or completely filled with the curable

curable composition. The curable composition is applied in known manner. The volume of the gap is to be larger than the amount of curable composition applied so that none of the curable composition is pressed out at the edges. The maximum  
5 size of the gap is to be chosen such that the wetting or adhesion of the freshly-applied composition is sufficient to retain the composition in the gap. The curable composition does not need to be applied or distributed over the whole width of the sealing surfaces. A gap free application in the  
10 form of a bead is sufficient. With corresponding flange geometry, the application can, e.g., also be at the edge surface of the flange of the engine block, i.e. on a surface which lies parallel to the direction of the assembly comprised of the oil sump and engine block.

15 The process according to the invention is especially suitable for cases in which the oil sump need not contribute to the overall rigidity of the engine or other machine.

20 The advantages of the invention have a particularly clear effect when attaching an oil sump to the engine block. The invention can, however, on principle be used when making flange connections with which threaded bolts were hitherto used as connecting elements. The process according to the  
25 invention is also suitable in the same manner, e.g., for the attachment of valve covers and of covers or lids to timing cases or gear boxes.

An embodiment example of the invention is explained in more  
30 detail in the following with reference to the drawing. There are shown in:

Fig. 1 in section, the edge of the oil sump and of the oil  
35 sump opening of the engine block with a first embodiment of the fixing means;

Figs. 2 to 4 in section, the edge of the oil sump with other



embodiments of the fixing means.

Fig. 1 shows an oil sump 10 which is fixed to an engine block 30 by means of a curable composition 20. The edge 12 of the oil sump 10 is bent to produce a substantially flat first sealing surface 14 (bend 15). The engine block 30 has an oil sump opening 32 surrounded by a flange which has a substantially flat second sealing surface 36. There is a layer 22 of the curable composition 20 between the two sealing surfaces 14, 36.

The bend 15 of the edge 12 of the oil sump 10 has a radius of about 4.5 mm so that the distance of the sealing surfaces 14, 36 from the inside of the oil sump 10 diminishes progressively. The thickness of the layer 22 of the curable composition 20 located between the sealing surfaces 14, 36 is, therefore, not uniform but is at its greatest on the inside of the oil sump 10 and decreases outwards.

Bent against the outer edge of the sealing surface 14 of the oil sump 10 is a fixing edge 16 which encompasses the flange 34 of the engine block 30 to the extent that the oil sump is fixed to the engine block 30 during the further assembly of the engine and the motor vehicle. The fixing edge 16 snaps or locks round the flange 34 when the oil sump 10 is pressed against the flange 34.

Later during the running of the motor vehicle, the fixing edge 16 simultaneously forms a safeguard against a detachment of the oil sump 10 from the engine block 30 in the event of an accident or other sudden stress impact.

Fig. 2 shows another possibility for fixing the oil sump 10 to the engine block 30. In a manner similar to that in Fig. 1, a fixing edge 16 is provided but barb-like tongues 18 which rest against the upper side of the flange 34 are pressed out from the fixing edge 16.

Fig. 3 shows a fixing of the oil sump 10 to the engine block 30 in which the fixing edge 16 of the oil sump 10 is reshaped after the application of the curable composition 20 and the joining of the oil sump 10 and the engine block 30 so that it encompasses the flange 34. This reshaping need not extend over the entire edge 16 of the oil sump 10. A pointwise fixing at a distance of, e.g., 20 cm is generally sufficient.

Fig. 4 shows an embodiment in which the edge 16 of the oil sump 10 forms an outwardly directed flange 38. After the application of the curable composition 20 and the joining of the oil sump 10 and the engine block 30, clamps 40 are attached which hold the oil sump 10 against the flange 34 of the engine block 30 during the curing of the composition 20.

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Example:

To join together an oil sump 10 stamped from steel sheet and a cast steel engine block 30, the sealing surfaces 14, 36 are cleaned of loose dirt particles and dried. The sealing surfaces 14, 36 have a covering width of about 9 mm, and a bead about 3 mm in diameter of the curable composition 20 - which corresponds to about 10 g/m - is applied to one or both sealing surfaces 14, 36. LOCTITE® RTV-Silikon 5900 is used as curable composition 20. The oil sump 10 is then moved up onto the flange 34 of the engine block 30 so that the fixing edge 16 snaps around the flange 34. The bead of the curable composition 20 is pressed out to give a layer 22 about 0.5 mm thick and a part of the composition 20 is pressed inwards to the bend 15 of the edge 12 where the composition 20 forms a meniscus 24 between the oil sump 10 and the flange 34 of the engine block 30. Because of the high viscosity of the curable composition 20, the meniscus 24 is convex.

List of reference numerals

- 10 oil sump
- 12 edge
- 14 sealing surface
- 15 bend
- 16 fixing edge
- 18 tongues
- 20 composition
- 22 layer
- 24 meniscus
- 30 engine block
- 32 oil sump opening
- 34 flange
- 36 sealing surface
- 38 flange
- 40 clamp

Patent Claims

1. Process for attaching the oil sump (10) to an engine block (30) of a combustion engine, a seal being made between the engine block (30) and the oil sump (10) by means of a curable composition (20), characterized in that
  - a curable composition (20) is used whose adhesion when cured is sufficient to secure the oil sump (10) to the engine block (30).
2. Process according to claim 1, characterized in that a curable composition (20) with an adhesion of at least 0.5 N/mm<sup>2</sup>, especially of more than 0.8 N/mm<sup>2</sup>, is used.
3. Process according to claims 1 or 2, characterized in that the curable composition (20) is a silicone composition.
4. Process according to one of claims 1 to 3, characterized in that an oil sump (10) stamped from steel sheet or made from plastics material and a cast aluminum or grey cast iron engine block (30) are used.
5. Process according to one of claims 1 to 4, characterized in that the oil sump (10) is fixed to the engine block (30) at least during the curing of the composition (20).
6. Process according to claim 5, characterized in that threaded bolts are not used as fastening elements and in that the edge of the oil sump is designed such that a self-fixing takes place when the oil sump (10) is joined to the engine block (30).
7. Process according to claim 6, characterized in that the oil sump (10) has a fixing edge (16) and the engine block (30) has a flange (34) and in that the fixing of the oil

sump (10) takes place by the snapping of the fixing edge (16) onto the flange (34).

8. Process according to claim 5, characterized in that barb-like tongues (18) which rest against a flange (34) on the engine block (30) are formed at the edge (12) of the oil sump (10).
9. Process according to claim 5, characterized in that the edge of the oil sump is designed such that the oil sump (10) is fixable to the engine block (30) by a reshaping process taking place after joining.
10. Process according to claim 5, characterized in that after the oil sump (10) has been joined to the engine block (30), holding clamps (40) are attached in order to fix the oil sump (10) to the engine block (30).
11. Process according to one of the claims 1 to 10, characterized in that there are formed on the oil sump (10) and the engine block (30) sealing surfaces (14, 36) which are shaped such that the sealing gap formed between them increases in size inwards.
12. Combustion engine having an engine block (30) and an oil sump (10) attached thereto, characterized in that the oil sump (10) is attached to the engine block (30) with a curable composition (20) whose adhesion when cured is sufficient to secure the oil sump (10) to the engine block (30).
13. Combustion engine according to claim 12, characterized in that the composition (20) when cured has an adhesion of at least  $0.5 \text{ N/mm}^2$ , especially of more than  $0.8 \text{ N/mm}^2$ .
14. Combustion engine according to claims 12 or 13,

characterized in that the curable composition (20) is a silicone composition.

15. Combustion engine according to one of claims 12 to 14, characterized in that the oil sump (10) is stamped from sheet steel or made from plastics material and the engine block (30) consists of cast aluminum or grey cast iron.
16. Combustion engine according to one of claims 12 to 15, characterized in that threaded bolts are not used as fastening elements and in that the edge of the oil sump is designed such that a self-fixing takes place when the oil sump (10) is joined to the engine block (30).
17. Combustion engine according to claim 16, characterized in that the oil sump (10) has a fixing edge (16) and the engine block (30) has a flange (34) and in that the fixing of the oil sump (10) takes place by the snapping of the fixing edge (16) onto the flange (34).
18. Combustion engine according to claim 16, characterized in that barb-like tongues (18) which rest against a flange (34) on the engine block (30) are formed at the edge (12) of the oil sump (10).
19. Combustion engine according to claim 16, characterized in that there are formed on the oil sump (10) and on the engine block (30) sealing surfaces (14, 36) which are shaped such that the sealing gap formed between them increases in size inwards.
20. Flange connection with two flange elements between which a seal is made with a curable composition, characterized in that threaded bolts are not used as connecting elements.

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Process for attaching the oil sump to an engine block of a  
combustion engine, combustion engine with which the oil sump  
is attached to the engine block in accordance with that  
process, and flange connections which are made in accordance  
with that process  
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ABSTRACT

For attaching the oil sump (10) to the engine block (30) of a combustion engine, a seal is made between the engine block (30) and the oil sump (10) by means of a curable composition (20). The adhesion of the composition (20) when cured is sufficient to secure the oil sump (10) to the engine block (30). The adhesion should be at least  $0.5 \text{ N/mm}^2$ , especially more than  $0.8 \text{ N/mm}^2$ . The curable composition (20) can be a silicone composition. The oil sump (10) can be fixed to the engine block (30) at least during the curing of the composition (20). To this end, the edge of the oil sump can be designed such that a self-fixing takes place when the oil sump (10) is joined to the engine block (30).

(Fig. 1).

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Fig. 1

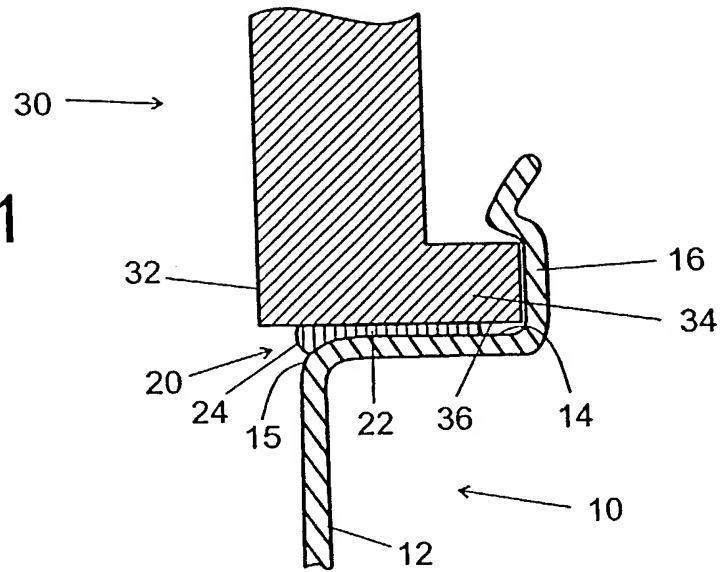
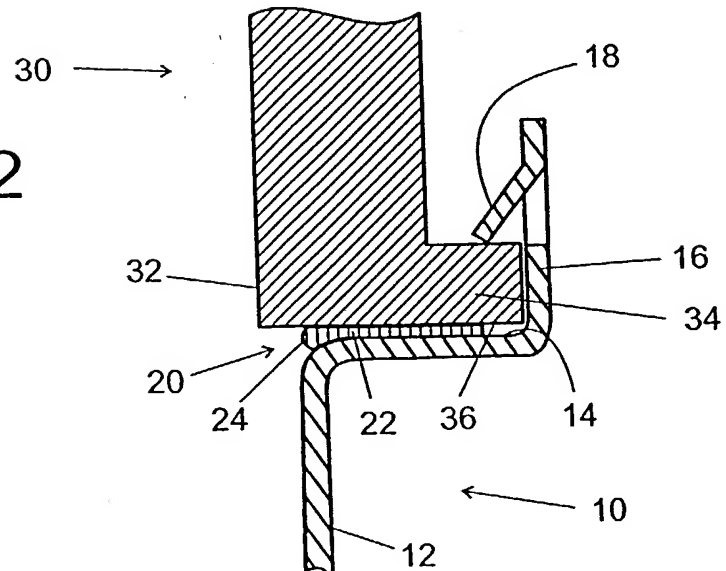


Fig. 2





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Fig. 3

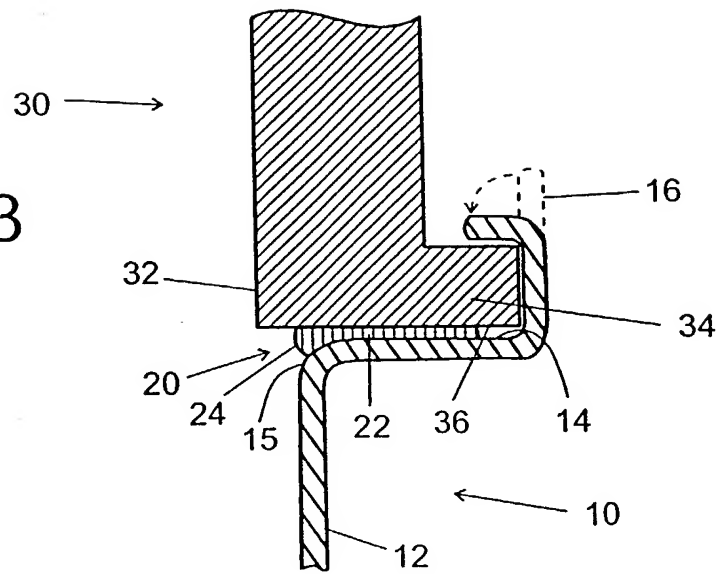
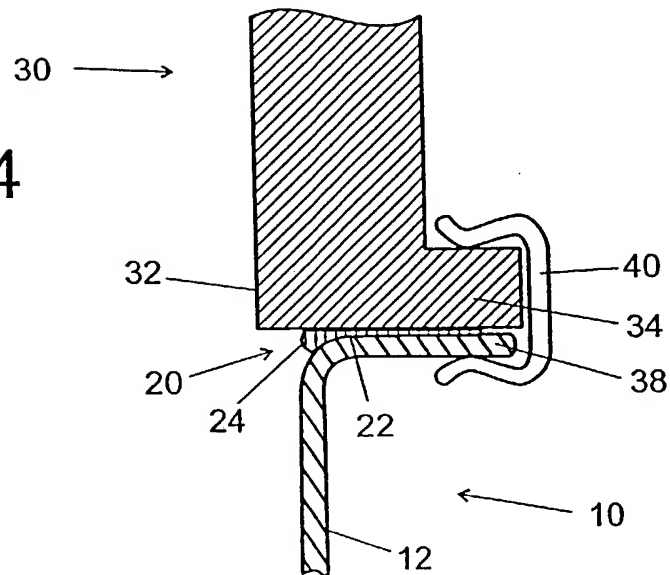


Fig. 4



PATENT

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**COMBINED DECLARATION AND POWER OF ATTORNEY**

**(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL, CONTINUATION OR CIP)**

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As a below named inventor, I hereby declare that:

**TYPE OF DECLARATION**

This declaration is of the following type:

- ☐ original
- ☐ design
- ☐ supplemental
- ☒ national stage of PCT
- ☐ divisional
- ☐ continuation
- ☐ continuation-in-part (CIP)

**INVENTORSHIP IDENTIFICATION**

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**TITLE OF INVENTION**

*PROCESS FOR ATTACHING THE OIL SUMP TO AN ENGINE BLOCK OF  
AN INTERNAL COMBUSTION VEHICLE*

**SPECIFICATION IDENTIFICATION**

the specification of which:

(a) ☒ is filed concurrently herewith.

(b) ☐ was filed on \_\_\_\_\_ as ☐ Application No. \_\_\_\_\_ or ☐ Express Mail

Mailing

Label No. \_\_\_\_\_, as Application No. not yet known, and was amended on

(if applicable).

(c) ☐ was described and claimed in PCT International Application No. \_\_\_\_\_ filed on

\_\_\_\_\_ and as amended under PCT Article 19 on \_\_\_\_\_ (if any).

**ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR**

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

**PATENT**

**Attorney Docket No.: ICC-192/PCT/US**

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations § 1.56(a).

✓ In compliance with this duty, there is attached an information disclosure statement (37 CFR 1.97).

**COMBINED DECLARATION  
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Attorney Docket No.: **ICC-192/PCT/US**

**PRIORITY CLAIM**

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate, § 119(e) of any United States provisional application, or § 365(b) of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(d) ☐ no such applications have been filed.

(e) ☒ such applications have been filed as follows:

**EARLIEST FOREIGN APPLICATION(S), IF ANY, FILED WITHIN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION**

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119	
DE	19902817.6	25 JANUARY 99	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
			<input type="checkbox"/> Yes	<input type="checkbox"/> No
			<input type="checkbox"/> Yes	<input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365 (c) of any PCT International application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112.

(f) ☐ no such applications have been filed.

(g) ☒ such applications have been filed as follows:

APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 120
PCT/EP00/00536	25 JANUARY 00	<input checked="" type="checkbox"/> Yes

**POWER OF ATTORNEY**

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

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**COMBINED DECLARATION  
AND POWER OF ATTORNEY**

**Attorney Docket No.: ICC-192/PCT/US**

**DECLARATION**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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